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The Manager's Responsibility for Production

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THE title of this paper enunciates the fundamental principle of Scientific Management: "The Manager's Responsibility for Production."

The existence of this responsibility appears so self-evident that the necessity for insistence upon it may seem peculiar. It may be said, however, that the importance which should be attached to the matter and which we shall be obliged to emphasize has not been generally understood.

Our great French fable writer, La Fontaine, shows us in *The Bemired Cart Driver* that the driver's first impulse in this predicament is to make use of his whip. It would undoubtedly be quite unfair to accuse the employer of obeying the same impulse. He has of his own accord abandoned "driving" in favor of the bonus. However, it has required an inspiration from on high to make him understand, as was the case with the cart driver, that his duty, as well as his interest, demands his intervention *to smooth out the difficulty before demanding exertion* or, in other words, to actually assume the responsibility for production.

PRINCIPLES OF THE MANAGER'S RESPONSIBILITY FOR PRODUCTION

To get a hearing, this inspiration, as Ralph Waldo Emerson puts it, "like those qualities still hid and expectant, must be disenchained and walk forth to the day in human shape." It is Frederick Winslow Taylor who represented the human expression of this idea. He saw the beginning of it in the study of the technique of the

work itself—in the work of the machine tool—when the scientific method was applied to it in so remarkable a manner, that our greatest savants offered it as a model even to men of science. That was the attack on the material obstacle and the first results were marvelous. Taylor made us see that the production of a machine could be increased by two or three times its previous output if properly designed, properly equipped with tools, and properly operated.

But he also demonstrated to us that it was impossible for the workman, if left to himself, to discover the means of obtaining such results or how to accomplish them easily, and that, in order to materially increase his production, he had, after he was selected by the manager in view of his all-round fitness for the work, to be guided and instructed by the management, and finally, convinced that he could work more intelligently and earn better wages with less fatigue by following the indicated path.

Finally, he demonstrated to us that the machinery, and more often the equipment of tools, were not only imperfect, but were also very far from being utilized in such a way as to produce what they should normally accomplish. The man who used them in the shop had an attitude which Taylor qualified as "systematic soldiering," and this attitude was characterized on the outside by the expression "restriction of production" adopted by the labor unions.

"Systematic soldiering" and "re-

striction of production" exasperated Taylor to the last degree. We see him going back to the source of the trouble, and recognizing that it arose from the very conception that the manager entertained of his functions; from his belief that he could put the entire responsibility of regulating all the details of the work, and of assuring adequate production, on the foreman and the workman, who were entirely incapable of attending to it properly, even when encouraged by the most ingenious system of wage payment.

The principle of the responsibility of the manager in all of the factors influencing production appears to us to be as follows: the establishment of a technique based on scientific experimentation; the intelligent selection and assignment of the workman; the development of the workman through instruction and training; and lastly, the preparation of the work, which sums up the putting into practice of the principle of responsibility and depends on numerous collaborators, all of which, although perfectly clear now, was far from being at all understood at the beginning.

The criticism of the methods generally employed was severe and there was reluctance to admit that it was just. In order to thoroughly understand its bearing the matter had to be viewed from quite a different angle than any which had previously been taken. Now, no great change in the orientation of ideas can be brought about quickly. New facts are first appreciated with the aid of old ideas.

The conclusion drawn by people in general from Taylor's investigation was that the workman did not work hard and that he could produce two or three times as much without unduly fatiguing himself. Moreover, they felt that it ought to suffice to offer a premium for greater production.

There were some, however, who were afraid that this method would bring about overwork and overproduction, the latter evidently being considered an evil, which might have been true if by overproduction a lack of equilibrium in production had been intended.

Such was the first welcome which Taylor's ideas received in France. It was followed by hasty attempts at application depending on the correctness of the conception entertained. Recourse was had to offers of bonuses which had the effect of accomplishing an increase in production on the part of individual workmen. These men, left to themselves, sometimes went so far as to overproduce, and such misdirected enthusiasm was followed by enforced pauses, then by a lack of material, or more often, by a lack of coördination in the ensemble of the work.

When these experiments were succeeded by demands which it was impossible to satisfy, strikes were precipitated which threatened to completely discredit the Taylor methods held responsible for them.

It was, however, only necessary to turn back to the teachings of the master to prove that his precepts had not been followed; in fact, that the very opposite track had been taken.

TIME STUDY AND WORK ANALYSIS

It was their failure to understand the position which Taylor gave to the principle the manager's responsibility for production which ran the authors of the first experiment so miserably aground.

In order to thoroughly grasp this principle and to appreciate its importance, the manager must undertake to make for himself an analysis of the operations executed in his shop. This is the only way to demonstrate to his own satisfaction

the weakness of *à priori* conceptions, which were, however, up to this time, considered sufficient guides in solving such problems of production as present themselves in a modern shop.

However, this is not as simple as it may at first appear. The writer of this paper must admit that in his own business, although favorably situated, he entered on this path with some reluctance, and that the personal influence of Taylor himself was necessary before he followed it in its entirety.

At the time he became acquainted with *Shop Management* published by M. Henri Le Chatelier in the *Revue de Métallurgie* he had for several years been manager of some very flourishing automobile factories, and his attention had been largely taken up with the problem of production. From the beginning he had applied himself almost entirely to the study of the plans of manufacturing and to as regular and constant a distribution of work as possible. Thanks to the method followed, he had obtained important results and had arrived at the point of conforming, with great regularity, to a complicated schedule of manufacture. But he was convinced that the manufacturing procedure in these factories, was above the prevailing average, and it was not easy, in this particular case, to greatly increase the production by its improvement.

On the other hand, the unsuccessful experiments, which had been made in the place where he happened to be and to which he has alluded, made it hardly desirable to attract the attention of the workmen to methods that were at the moment very unpopular.

However, one of the principles enunciated by Taylor had struck him with particular force—that of charging functional foremen with the training of the workmen—and it seemed to

him easy to take a step in this direction. The workmen of the shops which he directed were in the habit of consulting with the “layout” men when they were confronted with difficulties. These latter were young men from the technical schools who were consequently better educated than the workmen but were quite popular because they were treated on the same footing with them during their apprenticeship. The workmen and the “layout” men being on excellent terms, the workmen generally took in good part the advice the latter gave them. In order to take advantage of this situation it was decided to increase the number of “layout” men and to give a well defined function to each. One demonstrated how a jig should be used; another how the machine should be operated; another was engaged with the relations with the tool equipment; another, with the upkeep of the machines; another, finally, and more particularly, with the routing of the material through the shop, etc. The benefit of this measure was quickly felt without any necessity for discussion about the introduction of a new system or of anything approaching it.

This novel use of the “layout” men served still another purpose for the writer. He chose it as a subject of conversation at the time of his first conference with Taylor when M. Le Chatelier introduced them in Paris in 1912.

The author of *Shop Management* had been represented to him as very insistent on the manner in which his ideas should be put into practice; and he feared it might be difficult to interest him in any adaptations, however necessary they may have seemed. Far from criticising what had been done, Taylor voiced his approval of what he considered an evidence of tact, and

from that moment, he seemed to lend himself willingly to an exchange of ideas.

Strange as it may seem, it is difficult for the writer to make clear today, how far he was at this time from having grasped Taylor's idea. He remembers, however, that when he saw him again in Philadelphia several months later, he propounded certain questions on the effect of these methods on the workmen, which probably would have greatly surprised Taylor had he not become accustomed to meeting continually a similar lack of understanding. Taylor took the pains to repeat an explanation which he must have made more than a hundred times and, after a visit to the Tabor Manufacturing Company, he introduced the writer to his principal collaborators and experts with whom he could continue to keep in intelligent touch while visiting the shops in which the new methods were applied. For the writer this was the beginning of a more exact appreciation of the meaning of the responsibility of the manager for production.

On his return to France he received visits from Mr. Taylor and from several of his new American friends, with whom he had long and fruitful conversations on these questions concerning Scientific Management. However, on the eve of departure, in a letter which he treasures highly, Taylor once more advised the writer to devote himself to the study of one particular piece of work, and to push this study to the very bottom.

When he undertook to put this advice into practice he was very soon convinced that the detailed study of any piece of work opens the eyes in an astonishing degree to the extent of the manager's responsibility for production. To cite only one typical example, let us take the case of a work-

man's drilling small holes in the caps of the connecting rods of automobile engines. This operation required only a slight effort, but the man who did it was continually stooping to pick up the caps from the ground. His output was considerably reduced on this account and he tired himself out. It would have been entirely different if the machine which he used had been supplied with a table on each side so that he could without any trouble pick up the piece to be drilled when he put down the one already finished. But the shop was too crowded to arrange for these two tables.

However, as the machine thus equipped would have taken the place of two or three machines such as were used under conditions just described, the problem was not insoluble. But it was a problem of broad and far-reaching scope, involving more than the drill press in question as it required the complete rearrangement of the shop. It was a demonstration of the importance of doing away with the congestion of the factory—a point on which Taylor insisted—and he made the writer visit the Tabor Manufacturing Company. This apparently simple demonstration was a veritable revelation.

In continuing, in a still somewhat casual manner, this analysis of a piece of work, by making time studies on a few tasks without bringing about any change in the method of their execution, the pace of the workman varied greatly depending upon whether he had just had his fortnightly payment figured from his piece work tickets or time cards, or whether he was approaching the time when this was due to be done. The output varied as much as a hundred per cent and, moreover, the most expert eye was unable to account for it after taking a general impression of the situation.

This observation was not made by a stranger, but by the very man who had established this factory and had been managing it for more than ten years with a zeal which he has since brought to bear on an analysis of the work. In this case it was necessary to take up and correct the method of compensation for the work which did not furnish sufficient incentive to the workman.

The principle on which this method of figuring earnings rested was, however, equivalent to the system of a fixed bonus for a given output, which is in itself perfectly acceptable, but the estimating of the time which served as a basis for its application was not pushed far enough. It had, in particular, the fault of being limited to cutting time instead of extending over all such operations as management, distribution of material, etc.

Many people to whom these examples have been cited have thought that they must have occurred in a very badly managed factory which was far from the truth. This shop was justly considered one of the best of its kind and it may be said that the prevailing spirit was excellent.

From this time on the writer's conviction was completely established as to the responsibility of the manager for production.

THE OLD-TIME ARTISAN IN INDUSTRY

It was necessary, then, to admit that the conditions under which modern industry functions demand that the manager assume a far greater responsibility for the operations of the shop than he had previously done, and that, failing to assume this responsibility he can obtain only an unsatisfactory output. How could such a situation have come about? How had it succeeded in perpetuating itself? In

order to explain it we must take up again the origin of the development of the modern manufacturer.

Industry is obliged to exercise many different functions. The manufacturer must form a conception of what articles industry should produce, and then make them realities and bring them to a degree of perfection compatible with the means at his command. Finally, it is his business to produce these articles in greater or less quantity. The relative importance of the place occupied in industry by (1) the conception, (2) the realization and (3) the production may serve to characterize the different stages of the development of industry.

The relatively simple conception of the primitive artisan was followed by only crude and imperfect accomplishments. Then, as the skill of the artisan developed his conceptions became bolder and they were often realized with remarkable perfection after the greatest difficulties had been surmounted. But this was exceptional and all the ingenuity, and even at times the science expended by the author, was finally lost to the world; because if not jealously hidden, it was unrecorded.

Finally, with the desire of obtaining these articles in quantity and as perfect as possible, came the period of production which is characteristic of modern industry. In the last few years it has acquired an importance altogether exceeding anything ever attributed to it in the past.

But our conceptions of industrial organizations have continued to be strongly influenced by the man who had directed them at the beginning; *i.e.*, by the artisan such as he was two hundred years ago, who was the object of a profound admiration on the part of our ancestors.

We picture him as a man of extraor-

dinary intelligence and skill, endowed with such personal resources that he could, by himself, conceive and execute the entire work, surmount all the difficulties, and penetrate by a marvelous intuition all the secrets of nature.

We do not hesitate to do him homage, and we shall always hope to find him on every round of the ladder of industrial organization from the manager to the workman. He is the exceptional man on whom our ideal is modeled.

Far be it from us to seek to dim the memory which this desirable individual has left behind, but if his masterpieces, which we love to study, arouse our admiration, they frequently make us feel a regret that all the skill of the author has disappeared with him without leaving any trace, and that these masterpieces constitute rather a challenge than an example. In fact he produced little and failed to be a leader of men.

This artisan, however, has continued to exercise a preponderating influence as the problem of intensive production has arisen. He has no longer applied himself to accomplishment through physical effort and skill but to the development of more or less automatic machinery which, following the formula adopted by the economists, is able to transmit his skill to a number of men. He has succeeded in it even when he was handling such delicate tasks as those which the Jacquart looms perform, and naturally enough, has continued to be our inspiration. It is from him that the type of industrial organization, called in France *débrouillage*, based upon individual force and ability, has developed, built from top to bottom on the presence of "the exceptional man," and upon the shrewdness of the individual. Since the French artisan has been from time immemorial among the most

remarkable, we have had in France more than elsewhere, perhaps, and for a longer period, a great confidence in this organization, which after all has made it possible for us to turn out new products promptly and even to obtain high grade goods although often in limited quantities.

We are obliged to conclude, however, that the organization of *débrouillage* is not sufficient to satisfy the demands of the era of production and that we must adopt a new standard. This new standard, however, will permit us to utilize better than ever before the qualities to which our old time artisan owed his incontestable superiority and which he has bequeathed to his descendants.

NEW INDUSTRIAL CONDITIONS

The industrial manager must not only assume the responsibility for production in a far greater degree than has ever been done in the past, but he must also get an entirely new conception of his function and must use entirely different methods in the practice of it.

Where, following the tradition of the past, the manager believed that he was able, on the one hand, to base his judgment and rest his authority almost entirely on intuition, and on the other hand, that he did not have to depend on anything but individual effort when it came to action, he now must perceive that in the future it is necessary for him to submit his intuition, however valuable it may be, to the control of experimental science, and to call on all the specialized departments to coördinate that collective effort which has become indispensable.

What has been accomplished is nothing short of an absolute reversal of accepted ideas. However, there is nothing in this that is peculiar to industry. On the contrary, it is the river bar

which drives back the stream again when it changes the course of the current behind it. The shop seems to have been one of the last places that it has reached.

For a long time the *à priori* conceptions, emanating from the brain of an exceptional man, have been considered the normal points of departure for the works of science, and the most sure support of the leader's authority. Scientific experiment for the determination of facts or rules was regarded as an entirely too complicated and even too uncertain quantity to be utilized.

But one day, a fact, as simple as the fall of an apple, intently observed and carefully interpreted, threw over science such a vivid light that it has been able to completely transform its methods and to give its proper place to scientific experiment.

In becoming experimental, science has been able to endow industry with enormous resources, whose practical use has given birth to the present-day civilization, which exacts collective effort in the highest degree.

However, ideas are adapted but slowly to the conditions of this new life. Individualism has not abandoned its habits of domination without protest nor without producing considerable friction. But the case of the factory is particularly curious because up to this time it seemed to be the last thing to take into account a situation which could not have developed without its aid.

The work shop was born and has developed under the influence of the ideas of a former time. There also, the analysis of facts and experience began by being considered too complicated to serve as guides for the management. A study of the details, far from being scientifically undertaken, was abandoned in favor of the inspiration of the workmen and of their immediate superiors. It took Taylor to dissipate this error and to show that in the work shop as elsewhere a study of the facts, however simple, constitutes the only basis on which one can build a line of stable management, and that it furnishes also the means of accomplishing effective coöperation among all the component parts of a modern factory. This is a point of first importance.

Finally, the use of machinery has made it possible to call collaborators to the factory who could not up to that time apply themselves to any but the roughest, the most thankless and the worst paid tasks. One would expect them to find themselves very happy because of their liberation. But in these very men, this new spirit manifested itself, born of the living facilities created in civilized countries by the development of industry itself, making men desire in the shop, as elsewhere, a certain participation in the intellectual as well as in the business life. These are aspirations which should not be ignored, for if they are thoroughly understood they can be of invaluable assistance to those who have the responsibility for production.